GARS NEWS

Gwinnett Amateur Radio Society

JANUARY, 1994

THE PRESIDENTS PEN
by John Fearon, W4WKP

1994 is upon us. Since this also signifies a time very close to the ending of my presidency I decided to sit, reflect and take stock of what all has occurred in GARS this year.

I would like to give thanks to the many people who helped this come about. Your executive board or me as President alone, could not have done it. It has taken the participation of the members to make it as good as it has turned out to be. I want to thank the various people who have played key roles in different areas of GARS this year:

I give special thanks to the people who participated in the bike ride sponsored by the Gwinnett Touring Club and coordinated by Sam Roundtree, KD4HMC. This was a great effort.

Further, I would like to thank the people who participated in the bike race for the Buford Church of God, coordinated by David Adcock, KA4KKF.

More recently Howard Gould, W4NVF has successfully made arrangements to become a contact Volunteer Exam Coordinator, and with the help of other members is in the process of setting up GARS Volunteer Examiner Teams. This is an avenue in which GARS will now be able to play a key role in as we have really needed to do in previous times, but did not have the manpower.

Thanks to Pete Shaw-K4LDR, John Scott-KD4VHG Charles Evans-WA4QYY and Bob DeGrippo, KR4DA for their devoted efforts when it became necessary to go up and down the water tank.

Thanks to Paul Wolfe, AD4NQ; Ron Davidson, K4HRB; Dean Matthews, AD4OD; Richard Barnes, W4IXN; George Neville KD4SIL; Pete Shaw, K4LDR; and Bob DeGrippo, KR4DA for their devotion to repeater maintenance this year.

Thanks to Jean, KA4BNG and Jay Sager, WA4BXA for their help in reserving the Red Cross building, always being their to unlock it, and providing the coffee to help keep use awake through the business meeting. Being involved in GARS since its' inception they have never failed to do countless good deeds for the benefit of GARS, I appreciate that.

Thanks to Pete Shaw, K4LDR and Paul Wolfe, AD4NQ for providing a vehicle by which members can send their DX cards.

Thanks to Stephanie, KE4EPV and "her girls" for an exemplary job on planning and carrying out the Christmas Party. The party was great, there was very little food left, and about 50 people were in attendance. I think this was one of the best parties we have had in a long time.

Thanks to Chuck Calmbacher, AD4JU for making sure the hold harmless agreements were signed for the work parties on county property. Also thanks for copying and collating several issues of the GARS NEWS this year.

Thanks to Duane Hansen, KD4KCR for his dedication and motivation to our new members in helping them upgrade, and for his fine work in coordinating the GARS net and CW Practice sessions.

Thanks to Pete Shaw, K4LDR for handling the sale of the HY-Gain 204BA beam donated by Howie Gould, W4NVF. Thanks also for storing the equipment owned by GARS, and for Margaret, KE4CXI and Petes efforts with the newsletter, and for Pete conducting the Simulated Emergency Test. Thanks also for assisting in the growth of GARS by sending out membership applications throughout the year and telling new people on the air about the club, and for his efforts in locating a copy of the original GARS Charter. Thanks to Pete, also for establishing an open line of communication with the Gwinnett County Police and Fire Departments, and for coordinating the tour through the Gwinnett Communications Center.

Thanks to Neal Johnson, KC4LU for the donation of the batteries for the main site power back-up system.

Thanks to Rick, KD4MQR for the donation of a new air conditioner for the main site building, the beautiful control system for that unit, and for repairing the old units.

I have been very fortunate during the last part of the year to have a wonderful vice-president in Jud Whatley, W4NZJ, who helped me with things that I could have handled by myself. Thanks also for the great job you have done in handling the publicity of the club. Jud puts in a lot of time and effort posting messages into the local newspapers, telephone and packet BBS's, and other club newsletters.

Thanks to Pickett Cummins, AD4S for being one of the finest secretaries any club president could hope to have, and to Dean Matthews, AD4OD for his tremendous devotion to the club both as Editor and Treasurer as well as his service on the repeater committee. Without both of you, this year would not have been near the positive year for GARS it has.

Thanks to John Scott, KD4VHG for his dedicated field day efforts. I am sure it has been a learning experience for him, as well as many GARS members who participated. It is Johns desire to head up the field day team next year, which with everyones help, should be even better than last year.

Thanks to Mark Pratt, KD4VHS for his service as membership chairman.

Thanks to Paul Bennett, KO4ZS for his service as Club License Trustee, and as repeater programmer this year.

Thanks to Arnold Soloman, KC4ZUA for his efforts as Program Chairman for the last two years.

Thanks to Larry Osborne, KD4QFD for the re-write he has done on the GARS By-Laws, which I hope will be brought up soon.

Thanks to Steve Idler, KA9UIE for his fine job teaching novice classes, as well as for serving as Vice-President for part of the year.

Thanks to David Adcock, KA4KKF for providing much needed help to our member Jason Hillborn, KE4BGE, a cerebral palsy victim by helping get his antenna put up.

Thanks to Mary Whatley, WB4ALU for providing paper to print the GARS NEWS on at no cost.

Thanks to Bob DeGrippo, KR4DA and his wife Jackie for their splendid job of heading up the GARS Picnic, one of the best ever.

Many things have taken place of which we can be proud, though our club is not perfect. While our activities are becoming more varied, there is much more to be done in the future. I feel a great deal has been accomplished this year, and look forward to an exciting 1994.

GARS
HAM of the MONTH
by John Fearon, W4WKP

The GARS spotlight this month falls (ouch) on Tom Henderson, AC4UR. He is an Extra Class operator and lives in Snellville. Tom retired in 1979 from Chrysler Corporation as a Regional Service Manager.

He runs an Icom 751A and an Ameritron AL811 amplifier with an A3 beam antenna. His main band of operation is 15 meters where he enjoys ragchewing and DX. He also runs a Kenwood 231A on 2-meter mobile in his truck.

He doesn't get to come to club meetings much because he is a quiet fellow. He also spends a lot of time traveling back and forth with his wife to Mobile, Alabama to see their daughter. I am sure the weather would be better on the bay this time of year. Tom is going to serve on our GARS Volunteer Exam Team and hopefully we can encourage him to key the mike and talk on the repeater instead of just listening.

NEW CALLSIGNS and UPGRADES

☺ James Hansen is now KE4IKL, a newly licensed technician. When first heard on the air he was having trouble talking through a two foot wide smile.

☺ Dean Matthews, AD4OD, now an Extra Class licensee used to be KN4MK.

CONGRATULATIONS! Sincerest apologies to all who may have been missed here, please let us know about your accomplishments that you may be included in the next GARS News.

GARS NEWS

GARS NEWS is the official monthly organ of the Gwinnett Amateur Radio Society serving its members and other persons interested in the advancement of the amateur radio art. Articles and submissions are invited and encouraged. Submit news items via the GARS conference on the Scientific Atlanta BBS, on disk or in writing to the editor or assistant editor at their Roster address, via Fax at 339-1394, or on packet on 145.07 to the AD4OD-3 PBBS. Special arrangements can also be made to accept dictation via the phone as well. Most DOS disk formats and file types can be read, contact the Editor for odd format compatibility. Deadline for article submissions is the first friday of each month.

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COMMITTEES
REPEATER:
Chairman: (Position open, contact Johnny, W4WKP)

K4KAZ	Fred Runkle	945-6356
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PUBLICITY: W4NZJ Jud Whatley		972-8940
FIELD DAY: KD4VHG John Scott		978-0995
HAM CLASSES: KA9UIE Steve Idler		513-0428

GARS ASSOCIATED MEDIA
GARS 2 Meter FM Repeater 147.075^MHZ +600 WD4JXR
GARS Conference in Sci-Atl phone BBS 903-5487
WA4IOB 6 Meter Beacon at 50.075^MHZ
WD4JXR-6/SNELLV Packet network node/digi 104.03^MHZ

SWAP, WANTED and SELL NET
Tuesdays at 9:00P.M. on the GARS 147.075^MHZ repeater.

MORSE CODE PRACTICE
An interactive morse code practice session immediately follows the 9:00 P.M. tuesday night net on the GARS repeater, and on thursdays at 9:00 P.M..

GARS MEETINGS
Third Thursday 7:30 pm At Red Cross Bldg on High Hope Rd. in Lawrenceville. Meeting format is an amateur related program, followed by a short break, and then the monthly GARS business meeting. Pre-meeting fellowship dinner at 6:00 pm at Shoneys on HWY 120, south of Hwy 316.

MEMBERSHIP NOTES
Remember, new members joining between September 30th and April 1st can due so for 1/2 price (I know, very punny). Such a deal! $12.50 for individuals and $17.50 for families.

THANKS TO
☺ Johnny Fearon, who covered this column in his Presidents Pen.

EVENTS
East Atl. LAN packet group – 2nd Sat monthly at 10:00am at the Scott Blvd Baptist Church in Decatur.

HamWatch – 1st Wednesday each month, Shoney's 11690 Alpharetta Hwy, Roswell (abt 2 1/2 miles North of Holcomb Bridge Rd across from North Fulton Hospital) Times: 6:30PM for dinner prior to meeting; Meeting is at 7:30 PM

Hamwatch – 3rd Tuesday each month, Shoney's 1949 Mountain Industrial Blvd, Tucker (Just North of Hwy 78) Times: 6:30 PM for dinner prior to meeting; Meeting is at 7:30 PM. For more HamWatch information contact KI4MQ Dan St Andre, HamWatch Secretary at 642-1317 Marietta, evenings.

DECEMBER MEETING

The December meeting was our Christmas party and had a maximum capacity crowd including some new friends as well as the old ones. "Stephanies' Girls" really put on a feed. Robin Fearon did a superb job on the turkey, and nobody left hungry unless that was their desire. Thanks, girls for a great party!

GARS GROWS GREATLY by GOLLY

5 new members were voted in at the December GARS meeting. Please welcome to GARS:
KE4CWI (T) Robert DiPrima
of Lawrenceville, Georgia
KE4FJU (T) George Dean of
Lilburn, Georgia
N2LHB (G) William Boebel of
Lawrenceville Georgia
KD4HLL (T) Shannon Case of
Buford, Georgia
Studying (!) Cheryl McClure of
Lawrenceville, Georgia

We Hadn't planned any business for the Christmas party but decided to not make these new members wait until next year to join. Welcome these newest GARS members warmly!

BIRTHDAYS IN FEBRUARY

2nd	KA4LPT	Robin Fearon
6th	N4PMI	Charles O'Conner
7th	KD4RBD	Sherrod DeGrippo
8th	W9RR	George Sensibar
12th	KF4PS	Darwin Christensen
13th	WA4ZUW	Carlton McPherson
16th	AK8E	James Fluronoy
20th	KA4EMV	Robert Deveau
23rd	KD4DLV	Brian Greer
26th	KD4QPC	Chuck Robison
26th	KC4WPL	Jon Lippert

Not on the list? Let us know! Ed.

CQ SKN
by J. Pickett Cummins, AD4S

So you still think working CW is dull and uninteresting. Well I wish you could have been with us on "Straight Key" night this year. A number of GARS members participated and had a ball.

Straight Key night is ARRL sponsored and is held each year on New Year's Eve. Most of us think it is a way to preserve the greatest number of amateur radio operators possible by keeping them off the streets on New Years Eve. It is not a contest in the normal sense but participants are encouraged to send a post card to the ARRL nominating someone that they worked during the event that had the best "fist".

Over the last few years, I have noticed that two traditions have evolved. 1) Always tell how old you are; and 2) Use the oldest equipment that you can get your hands on.

These traditions really make for some interesting QSO's. Instead of the very short exchange of signal reports that most contests spawn, this event encourages long, rag chewing kinds of contacts. Even for some of the newer hams who have not used some of the older equipment, the QSO's are interesting. Many new hams remember some of the equipment from friends or neighbors or it causes them to ask questions that keep the QSO going.

A couple of examples of interesting gear that were contacts that I had with a station in Oklahoma and one down in south Texas. The Oklahoma station was using a Heath Apache transmitter and a Drake R4 receiver. This ham had been on the air a little over 30 years and he had built the Apache from a kit hen he first got on the air. He had used it continuously since then. The Texas station was a snow bird from Iowa and was using a Yaesu FT-757 but the interesting thing about that contact was the he was using a mobile whip on the top of his car and had just run the feed line out of the window of his shack.

Everyone seems to be sensitive to everyone else being able to copy and are willing to adjust their speed accordingly. Granted, many of the fists on SKN leave something to be desired. (the author included). But somehow that all adds to the fun of the event.

This year was especially rewarding for at least five GARS members. After gathering back on the repeater to commiserate about their various contacts, this group decided to go to 80 meters and hold a round table. No one said anything, but I don't think any of us had ever tried to work a CW roundtable with five participants. The group assembled around 3534 and consisted of the author, Dean, AD4OD, Duane, KD4KCR, Steve, AD4LY and Ron, K4HRB.

The interesting thing about this round table is that no one discussed any particular protocol before we gathered on the CW frequency and no one seemed to have any trouble easing into the process. Another thing that was interesting is that no one mentioned whether they were working QSK or semi QSK but we realized after one particularly funny comment by someone that everyone was working some kind of break in. This was obvious when the first station

stood by and four other stations chirped in with a HI one station after the other. Dean said it sounded like a bunch of seals clapping.

The coup de gras for this round table was the five different types of keys being used. Duane was using his museum quality hack saw blade keyer, Ron was using a micro switch, Steve was sitting on the floor with his keyer paddle turned up on the side using it as a straight key, Dean had a real straight key that kept falling apart and the author apparently had the only working, real, died in the wool straight key.

We are seriously considering having some more large CW round tables (but not with straight keys). Duane mentioned that such an activity might become a GARS tradition. The author has observed that any GARS activity that occurs at least twice automatically qualifies as a tradition.

Everyone is encouraged to join the GARS CW round tables when they occur. Don't be concerned about the speed..you can be sure it will be adjustable. If we choose to use straight keys...it will be very slow. And we are really looking forward to calling CQ SKN next year.

ALINCO WARRANTIES
by Philip Milazz, KC6OEI

Do we look at warranty terms when we buy our toys? I haven't paid much attention in the past, but I'm going to from now on.

Alinco, for example, has changed theirs. The old policy was one year free repair or replacement in event of defect. Last year about this time, that changed. The current policy is six months free, then two years during which repairs cost $38 per. Looks to me like Alinco is using the paying customer for quality assurance.

This policy and my experience with defective units out of the box will lead me to buy the competition's products in the future.
Posted as a "To ALL" message on the Sci-Atl BBS. Reprinted without permission. -ED.

AMATEUR TV NET
On Video AND on 2 Meters!!
by Ralph Fowler

There is now an ATV net in Atlanta!!

The net meets every Thursday Night at 9:00 PM on the 146.655 MHz voice repeater. Many of the participants are also on video during the net. The video is on the Big Shanty Repeater Group's (BSRG) Sweat Mtn ATV repeater. Covered during the net are such topics as "How to receive ATV on a shoestring budget", "How ATV works", "What types of feed lines to use and how to get it free", "How does FM TV work and how is it superior to AM", "How can I get involved and TRANSMIT through the repeaters?".

There is also a question and answer session as well. Usually a video is shown after the net. Last week it was "The New World of Amateur Radio" with Frosty Oden. The week before, it was Dayton highlights. If YOU have a ham video you'd like shown, please get it to us and

we'll get it on a future net.

Join us for the net at 9 on Thursdays! Remember– 146.655 for the audio only and 427.25 MHz (CATV channel 58) for the ATV Audio/Video.

Our repeater is also available for use of local clubs wishing to televise their meetings as well as for instructional uses (such as ham classes, etc).

If you want to know more, we will be glad to mail you diagrams of easy to build antennae, and some pointers about ATV. Just send a self addressed, stamped (2 stamps) envelope to us. We'll be glad to pack it full of this and other useful info. Of course, catching W4KIP, N4NEQ, KD4SHH, K9EGA, or any of the other ATVers on 146.655 will always net you a good conversation on the subject.

See you on TV and here's the address:
BSRG ATV
PO Box 383
Kennesaw, GA 30144 (404) 936-3737
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S.T.A.R.S.
SciTrek Amateur Radio Station
Needs a "Few Good Hams"

SciTrek (the Science & Technology Museum of Atlanta located at 395 Piedmont Avenue, Atlanta) needs available amateurs to operate several amateur demonstration VHF/UHF (CW, SSB, Packet, ATV, etc.) stations to visiting tourists, school groups, etc.. The success of this adventure (maybe I should say...our adventure) depends on the amount and quality of volunteer support provided by the Atlanta amateur community.

Already, there are several such amateur radio museums operating throughout the USA. W4BFB in Charlotte, for example, has been very successful and quite popular. So...if you can volunteer to operate this equipment, assist in conducting tours, etc., you should contact John Talipsky, KI4Y at 447-5674 or Debbie Soruco, SciTrek, Coordinator at 522-5500, ext. 224. This is our chance as amateurs to demonstrate our unique public service and educational capabilities, our challenges as a hobby, and, most of all, how much fun it is!
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TWO GARS MEMBERS HELP TEAM TAKE GA SECTION IN JUNE 93 VHF/UHF CONTEST
by Jud Whatley, W4NZJ

Think GARS members don't get out and contest? Think again! Note page 118 of the December 1993 QST under the "4" ARRL section and Georgia, specifically. "Limited multi-operator" station W4CMA (Cedartown, GA Radio Club) took the winner's circle with 433 VHF/UHF contacts for a score of 69,900! Helping this winning team were GARS members: Arnold, KC4ZUA and Jud, W4NZJ.

The results of the more recent VHF/UHF Contest should be forthcoming with more GARS members helping attain even higher scores!

10 METER BEACONS
List is from 10-10 International News thanks to K2OLG

FREQ	CALL	LOCATION
28.0505	PY2GOB	San Palo, Brazil
28.175	VE3TEN	Ottawa, Canada
28.185	OA4VHF	Peru
28.200	KF4MS	St. Petersburg, FL
28.201	LU8ED	Argentina
28.2025	ZS5VHN	Natal, RSA
28.205	DL0IGI	West Germany
28.209	WA1IOB	Marlboro, MA
28.210	3B8MS	Mauritius
28.210	K4KMZ	Elizabethtown, KY
28.2125	ZD9GI	Gough Island
28.215	GB3SX	England
28.2175	WB9VMX	Oklahoma City
28.220	5B4CY	Cyprus
28.222	W9UXO	Chicago, IL
28.2225	HG2BHA	Hungary
28.2275	EA6AU	Balearic Island
28.230	ZL2MHF	New Zeland
28.235	VP9BA	Hamilton, Bermuda
28.2375	LA5TEN	Oslo, Norway
28.2425	ZS1CTB	RSA
28.2425	LU4FM	Argentina
28.245	A92C	Bahrain
28.2475	EA2HB	Spain
28.250	Z21ANB	Zimbabwe
28.2525	WB4JHS	Thomasville, GA
28.255	LU1UG	Gral Pico, Arg.
28.2575	DK0TE	Arbeitsgem, W. Ger.
28.260	VK5WI	Adelaide, Aust.
28.262	VK2RSY	Sydney, Aust.
28.264	VK6RWA	Perth, Aust.
28.266	VK6RTH	Albany, Aust.
28.270	VK4RTL	Townsville, Aust.
28.270	ZS6PW	Pretoria, RSA
28.2725	9L1FTN	Sierra Leone
28.2775	DF0AAB	West Germany
28.280	YV5AYV	Caracas, Ven.
28.284	VP8ADE	Falkland, Island
28.286	KA1YE	Near Rochester, NY
28.287	W8OMV	Near Ashville, NC
28.288	W2NZH	Morrestown, NJ
28.290	VS6TEN	Hong Kong
28.296	W3VD	Laurel, MD
28.2975	ZS1LA	Stillbay, RSA
28.299	PY2AMI	San Paulo, Brazil
28.315	ZS6DN	Irene, RSA
28.3255	DF0THD	West Germany
28.888	W6IRT	California
28.890	WD9GOE	Freeburg, IL
28.992	L0NF	West Germany

ANTENNA UPDATE

The Celwave 2 meter repeater "Super Stationmaster" antenna has been sent to Celwave for evaluation to determine whether it can be repaired for a reasonable price and, if so, for what amount. There is no charge for the actual evaluation by Celwave. Round-trip transportation is free via Southwire Company, Carrolton, GA as recognition of our public service activities. Arnold Solomon, KC4ZUA is credited with providing considerable assistance in preparing it for shipment, and Jud Whatley, W4NZJ for arranging transportation. Pete Shaw, K4LDR did the research with Celwave.

Ni-Cad BATTERY CARE
by Steve Sims, KD4WAK

I am far from an electronics expert. I just like to experiment with electronics. Recently, I got pretty involved in a project to make a portable power pack to use with my Garmin 55 GPS that turned out to be a great learning experience.

I had been rather disappointed with the longevity of batteries in the Garmin when the backlight is used. The Garmin allows for 4 AA batteries. Evidently, backlights in general consume a fairly large amount of power compared to just what the electronics of the device uses, and this causes the batteries to get drained in a fairly short period of time.

The Garmin has a power/data port that is separate from the battery pack. It accepts any voltage from 5 to 40 volts. This fact struck me as curious, and in the back of my mind I wondered what it takes to make a constant power circuit like what seemed to be in the Garmin. However, my immediate problem was to make an adequate portable power pack that I could throw in my flight bag and use when the occasion arose that I needed to fly.

I used an ammeter to measure the current draw of the Garmin in its various configurations. I found that the Garmin drew 360 ma with all options turned on at 8 volts. The current drain was roughly half that when the voltage was upped to 16 volts. At 32 volts the current drain was about 90 ma. Using rechargeable AA batteries I constructed a ni-cad pack consisting of 24 cells with a fully charged voltage (terminal voltage) of 32 volts. I used Radio Shack Hi Capacity 850 mah batteries for each cell in the pack. (At a cost of $3 per cell; $72!) This would last about 9 hours. Now I needed a way to recharge it quickly and conveniently.

It wasn't long until I had drained the pack the first time. It turned out that as the pack was near the end of it's charge the battery voltage dropped off rapidly. Of course, this was no problem to the Garmin which just kept sucking more current out of the pack to compensate until the entire pack got down to just under 5 volts. This was a bad situation for the pack.

A single ni-cad cell should be considered fully drained when it reaches 1.05 volts and NO FURTHER ATTEMPTS SHOULD MADE TO DRAIN IT FURTHER UNTIL IT HAS BEEN RECHARGED. Since my 24 cell pack had reached 4.92 volts each cell in the pack got down to an average of .207 volts! I was in for a surprise when I tried to recharge it the first time.

The terminal voltage of the pack would climb no higher than 28 volts. This was due to the fact that as the pack was recharged, relative potentials (voltages) of adjacent cells became proportionally different enough to cause the relatively high potential cells to actually reverse charge the relatively lower potential cells. This being the case it became impossible to charge those cells without removing them from the pack. So I charged the reversed cells individually and the pack has now achieved its full 32.5 volt potential.

I began to realize that it would behoove me to create a circuit to cut off the cells current

drain when the cell voltage dropped to 1.05 volts, or 25.2 volts for the entire pack. I constructed this circuit using an Lm339, proper voltage dividers, and a 78LS05 for voltage reference. For circuit cutoff I used a power mosfet the IFR510 (Harris). All of these parts can be purchased at Radio Shack for about $3.50.

For charging the circuit, I had two requirements. I had to be able to recharge it from the car, and it had to be recharged as fast as possible. Here I ran into my second problem. Namely how do you recharge a 32 volt battery pack using a 12 volt car system as a power source ?

I began to learn that making a circuit to change voltage efficiently, especially boost voltage was not necessarily a simple task. A transformer is a device that uses a principle called inductive coupling to change AC voltage or in the case of an isolation transformer, simply limit the current. But to use this method I would have to convert the cars 12 volt DC to AC, boost the voltage using a properly wound transformer, then rectify the AC off the secondary and smooth out any ripple.

I began to work on this circuit when someone told me about a switching power regulator. A switching power regulator uses a principle called inductive flyback to boost voltage. On an independent test board I began constructing a boost regulator that uses the 555 timer chip, a 330x1 amp inductor, an lm339 voltage comparator, a diode and several supporting components. (The lm339 and the 5 volt voltage reference I used were common with the auto cutoff circuit. The lm339 provides 4 comparitors on a single chip.)

Since this turned out to be quite efficient and easy, I never finished the inverter using the inductive coupling method.

The next problem was to make sure that I was not damaging the ni-cads by overcharging. Ni-cads can handle fairly high current (like 650-850 ma) as long as you be careful not to overcharge them. Ni-cads don't mind being overcharged as long as you do not exceed the manufacturers recommended max continuous overcharge current. (Usually something like 65-85 ma.)

There are several ways to accomplish this with varying degrees of efficiency, safety and convenience. One method would be to use a timer cutoff to limit the amount of energy that was put into the cell.

If the cell was completely discharged then it could be charged in 1 hour by putting 850 ma into it for that long. If you try this method, I recommend only putting 800 ma in for 55 minutes and then reverting back to max continuous overcharge current. Most wall and desktop chargers than are not classified as "quick chargers" simply current limit the charging circuit to max continuous overcharge current and put that through the battery forever. (This does not damage the battery, if the charger is working properly and battery was undamaged before charging began.) Indeed, the cell likes it and keeping it "on charge" like this way halts ni-cad "leak down".

Alternatively, a chip can be purchased from Maxium, 1-800-998-8800, for an intelligent

recharger chip that can safely recharge Ni-cads completely in as little as 15 minutes. The kit costs as little as $3 and the information kit is free. This works by alternately charging and detecting voltage slope to determine end of charge point. Additionally this method can be used to top off ni-cad batteries that are partially drained. High speed charging also helps by preventing and actually reversing "memory effect". (The high current breaks down the large crystal formations into smaller formations giving more surface area to the cathode active element.) I intend to put this circuit together in the near future as well.

For the moment, however, the fastest I can recharge my ni-cad pack is 1 hour 30 minutes. This fact in combination with ni-cad leak-down makes ni-cads impractical for my desired level of convenience. However, when I get my Maxium recharger circuit installed and working I will be able to insure that my pack is fully recharged by the time I have taxied out to the runway.

For now, I have begun using my Quantum lead acid "gel cell". It is a neat package containing all the circuitry necessary to recharge safely, discharge safely (short circuit protection), and monitor capacity (three leds on front panel). Since it is lead acid type it does not leak down. I can throw it in my flight bag and be assured of power when I need it. In my opinion, gel cells are, at present, the most user friendly form of power storage available.

There is new technology available, however, that may negate some of the negatives of ni-cads. Disposable batteries are, in fact, rechargeable, in some sense.

If you put reverse current through a disposable alkaline battery, it will store the energy that you put into it. Depending on the characteristics of the current you used to recharge it, you will get a variety of surprising effects, however.

My first attempt at recharging a disposable battery took a very conservative approach. I knew the battery was delicate and so I put a very low current (100 ma) into it for a long period of time (5 hours). The load I used to drain it was an ammeter in series with a flashlight bulb. For a control, I used fresh new Energizer cells in the same circuit. The new cells registered a current drain of 540 ma, a produced a pleasantly bright light.

My recharged cells produced a dimmer light, but burned for a longer period of time. It drew 340 ma. (The requisite amount of time considering the amount of charge I had placed on them.) I drew the (wrong) conclusion that I had damaged the battery by putting too much current into it.

The next test I did I put 50 ma into another freshly drained battery for 10 hours. (As before, I planned to conservatively charge the battery to only half capacity.) This time the light bulb did not appear to glow at all. The current drain was nearly nonexistent. (30 ma)
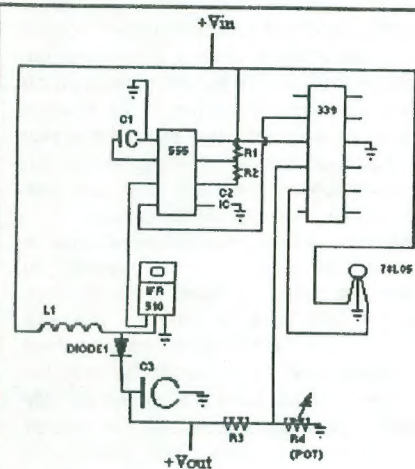
For a few moments I dead shorted the battery through the ammeter. It only pulled 100 ma through the dead short. I reestablished the dead short and left it for a while, monitoring it carefully. The current gradually increased. By the time the battery was drained, it was

drawing 450 ma through the light bulb! I pondered these effects for a while and did several similar tests to reaffirm my findings.

I then spoke to a few electrical engineers at work about the effect. Evidently, a migration occurs between the electrolyte and the plate. This migration (of some material) takes place while charging and reverses back into the electrolyte while discharging. (Unfortunately, it does not all go back in.) While it is present on

2. Possible Errors
Connections to pin 4,5 of LM339 may be reversed.
All unused inputs of LM339 should be tied to ground, even though not shown.

3. Setting Voltage
The greater the voltage division by R3,R4 the more energy the 555 will pump into C3 before the LM339 cuts the 555 off.
Up to a point, the faster that the 555 is driven the more current the circuit can handle, but the greater the inefficiency due to increased switching. Set C1,R1,R2 to suit your needs accordingly.

Notes:

1. Parts

L1 is a 330mh inductor capable of handling 1 amp of current.

C1,R1,R2 set the base timing of the timer.

C2 may not be necessary, it would provide stability to the oscillator however, stability is not critical to it's operation

C3 should be rated to handle the set output voltage.

R3,R4 set the output voltage.

Diode 1 can be a 2N4004, Schottkey Diode will provide greater efficency, however.

the plate, it give the battery an internal resistance just as rust would on a wire connection.

I then began recharging a few freshly discharged disposable batteries (FDDB's, ha ha). This time, I recharged them with 650 ma for 45 minutes. As expected, the resulting batteries exhibited less internal resistance upon reaching half capacity. The solution seemed obvious; or was it ? I couldn't just put 5 amps through the battery for 6 minutes, could I ? I didn't try it. It seemed obvious to me that doing so would destroy the battery's delicate internal structure.

I discussed my findings with an electrical engineering friend again and he suggested that the battery could withstand 2 amps for a few hundred milliseconds. So as a general guideline, a few hundred milliseconds on and then let it rest for 10 times that long. It would still charge fairly slowly, but it would eventually reach full charge and not build up an appreciable internal resistance.

This is as far as my testing has brought me to date. I have noticed, however, that there is a new brand of battery called Renewal which evidently is simply a fairly rugged form of the alkaline disposable. With a special charger (possibly a pulse charger ?) it can be recharged up to 25 times. (I estimated that

even if my pulse recharger worked, the little bit of extra residual internal resistance would build up to the point that it would not be wise to use after about 5 to 10 recharges.)

I have purchased a set of Renewal batteries and a Renewal charger for testing. I plan to put a scope on it and see what it does. Renewal batteries come fully charged, and do not leak down like ni-cads do. This tends to make them a rather user friendly form of power storage that as of now, in my opinion, almost rivals that of the "gel cell".

SUPER CHARGER
Product Review
by Dean Matthews, AD4OD

The Super Charger is a battery charger touted to charge alkaline as well as Ni-Cad batteries. In ham application my mind reeled at the prospect of recharging longer lasting alkaline batteries in a snap-in pack available for my HTs. Alkaline batteries put out a little higher voltage, and when new last much longer than Ni-Cads, which would help with the meager output of these radios.

The price, $49.95 was a little tough to swallow, but if it performed as advertised it would be worth it. I first saw the unit advertised on a national UHF station, with a big name celebrity, Dick Clark, expounding the virtues of it. Then I saw it locally in a Toys-R-Us store. I bought one on the spot, and hurried home to try it out.

Upon opening the package the unit looked good, but when I went to charge batteries, I found one of the charge arms had a bad spring. Undaunted, back to the store I went, a

little more queasy about the purchase.

The 2nd unit was physically fine. I read the operators manual (probably my downfall, I know) and stuck 4 batteries in that were about half discharged according to my battery tester. The unit tests the batteries, and if unsalvageable lights a red LED at that charging bay. A yellow LED at each bay indicated all was well and they were charging. A couple hours later, I noticed all the lights were green, indicating completed charging. I tested the batteries and found them to be fully charged, according to my battery tester.

According to the manual, old dead batteries usually could not be saved, and to recharge the batteries before draining them completely. I like the way the unit monitors charges each of its four charging bays separately, so you can change batteries individually. There was only one rub... the batteries did not hold enough currant to be useful much past their normal state. A battery that was at half charge would charge to green in a couple of hours, but be right back to half charge in just a few seconds use!

What good is this, I ask myself... back to the manual. On reading the fine print thoroughly, I see their intention seems to be that you take your batteries out of your equipment after a small amount of usage, and top them off with the "Super Charger". What a pain.

My goal was not to save the Earth by laboriously recharging my batteries every day, I wanted to recharge my alkaline batteries! Now I am glad I bought the unit at a reputable local store, so I can exercise my right to return the goods, which I did.

The bottom line, save your money.

PALOMAR TUNER-TUNER
Product Review
by Dean Matthews, AD4OD

There are a lot of gadgets out there for hams, but every now and then you come across one that changes the way you operate. Palomar Engineers PT-340 Tuner-Tuner is such a product. I thank Ron, K4HRB for bringing it to my attention.

Funny name, "Tuner-Tuner", isn't it? Well that is exactly what it does, helps you tune your tuner. It is a fairly small box just 5½ wide x 3¾ deep x 2½ high. It has one 2 position switch marked "Off" and "Tune" and one red LED which flickers brightly when in the tune position to remind you not to transmit. The unit has two SO239's for installation in the RF coax line immediately after your transceiver.

The operation is equally simple. Check to make sure your VOX is off to prevent any possibility of transmitting while using the Tuner-Tuner. Set the transceiver to the desired frequency and select the appropriate antenna. Switch on the Tuner-Tuner, a S-9 noise will be heard on the receiver. Rotate your inductor switch to look for the lowest reading of noise, tune the capacitors for the deepest null you can get in the noise, turn off the Tuner-Tuner and let-'er-rip. You are tuned! Without ever emitting a sound over the air! That is it. This is too easy.

I used to hate switching bands. It was such a hassle to tune up. On a crowded band you are always bothering somebody. I can't say enough good things about this device. It's almost like having a legal limit automatic tuner! We are going to do a test soon over at Steve, AD4LY's shack, because we think it will enable sightless folks to use standard tuners by listening to the null in the noise while tuning.

There is an internal fuse protecting the device in the event you forget and transmit through it, and that is the source of my only complaint. While the 9v battery that powers it is on the outside, the fuse is on the inside. I could just picture myself trying to tune for some rare DX and blowing that fuse, so I installed an external fuse holder to solve the problem. A simple fix.

This is not a new item. I looked back and saw an ad in QST for it in the August 1990 issue, and it's probably been around longer than that. I remember seeing those ads, somehow it never struck me the significance of what it does until Ron pointed it out. Several other *GARS members* expressed the same thing in later conversations. It looks like Palomar's marketing is not their strong suit. K4LDR and AD4S have subsequently bought one of these "magic boxes" and expressed the same satisfaction as Ron and I have had. In the November 1993 issue of QST it is listed at $99.95 + $4.00 S&H. I bought mine locally at HRO for the same price, less the freight but plus the tax, pretty much a tie. You can't go wrong.

HF AUDIO
by Dean Matthews, AD4OD

Let me start by saying that when hams talk of HF audio they are usually referring to the quality of sound the microphone and rig produce over the air, not the sound coming from the internal or external speaker. Most modern HF rigs come with great sounding audio, right? Before we can answer that we really need to define what great sounding audio is.

Beauty is in the eye of the beholder, as we have always heard. When someone tells me he likes my audio, I listen to his. If his is big and full of bass and room resonance I am afraid mine might sound like that. Perhaps that is his opinion of good audio, it is not mine. I think an object oriented approach is a much better one, that is, different styles of audio serve different purposes. Only you can decide if your audio is right for you so you need some way to hear it yourself.

Some rigs come with a monitor feature that lets you listen to your audio pretty much as it goes out over the air. It is difficult, however, to subjectively listen to yourself while you are talking. The very process of wearing headphones makes what you speak sound differently to yourself. Put your fingers in your ears and talk. You can still hear yourself, and with a lot of bass effect. Because of this the best way to objectively listen to your own audio is to have a friend tape record it over the air, and then listen to the tape in person. This works best if he can make a hard-wired

recording, rather than holding a microphone in front of his speaker. It is absolutely essential that you be on exactly the same frequency, and that is not easy as tuning is a subjective thing depending on how he perceives your voice to sound.

Here is a trick to get dead on frequency. Go to a music supply and buy a pair of A-440 pitch pipes (about a buck each) and give one to your friend. When you are ready for him to make a recording, have him blow into his over the air to produce a perfect "A" note. At the same time, while listening to his note over the air on your rig - blow into yours and tune up and down until the notes are exactly the same. Make sure your RIT or Shift controls are off. When the notes are the same, you are dead on frequency. You can double check this by reversing the procedure, you send the "A" and let him listen. If both rigs are transmitting exactly where they are receiving the note will be right on no matter who sends it! One of you could compensate with your RIT, Shift, or Clarifier control if one rig is a little off. For the purpose of this recording it is sufficient that what he hears matches his pitch pipe tone. Make the tape for the length of the QSO, occasionally checking for drift with the pitch pipes so you have enough of a recording to properly evaluate your audio.

Tailor your audio for a purpose. To me there are two basic types of audio for SSB. One type is full, mellow audio for roundtables and nets where the other stations are hearing you well.

SSB by nature cannot be made to sound like broadcast FM, the bandwidth is insufficient to carry that much audio information, so that is an unreasonable goal. For this type of work, you need sufficient lows so the audio is pleasant to listen to, and enough highs to give the audio some brilliance or "sparkle" to help carry your voice over the noise.

The other type of audio is "contest audio". Contest contacts are typically short exchanges, so listening comfort is a non-issue. The goal for this application is to have enough "punch" to make yours stand out over everybody else in the pileup. Low frequency response is a waste of power for this application, it consumes a lot of energy but does not carry well. An example of this is gas powered toy airplane engines. Noise pollution has become a problem in that hobby, so many flying fields passed noise limits to minimize complaints. When they did this, they found an interesting phenomenon. Large 4-cycle engines registered higher on a sound meter than smaller 2-cycles, but at a distance the 2-cycles were found to be much more objectionable and caused more neighborhood complaints due to the higher pitch of the noise. If you want to beat out the pack in a pileup, cut the lows as much as possible. This audio has a restricted unpleasant sound but really sticks out in a crowd.

Heil Sound sells a microphone they call their DX'ers Dream that is tailored for "contest audio described above. They also offer a smoother HC-5 for ragchew and roundtable use, and both elements are incorporated in a switchable arrangement in their Dual Ten microphone. Some rigs, like the 850 Kenwood are capable of altering their audio to suit either style of

operation, but the vast majority of rigs come with a stock hand microphone that is a poor compromise for either style.

Another problem encountered with microphones is age. Some microphone elements deaden with age. Some are fixable, others are not. One cure for an old dull microphone is to lay it in a frost free freezer for a few weeks. If moisture has damaged the element sometimes this will clear it out and make it useful again. Be sure to put it in a ziplock bag that has also been in the freezer when you remove it so condensation doesn't form on the element while it is warming up. Another method is to lay the microphone on the top of a constantly warm place, like a water heater of gas stove that stays warm due to pilot lights. You could also zip it in a plastic bag with a large amount of desiccant (that stuff that comes in little pillows to dry things out).

If you have a desk microphone with ribs or fins around the screen, chances are that you will find the audio to have a lot of room resonance, and bass. A common trick with these is to cover the fins up by wrapping them with electrical tape. If this restricts the audio too much, then you can open a fin or two partially by cutting away some tape until the desired audio response is attained. I had a desk mike with a 767 Yaesu, and not wanting unsightly tape to show, I curled some thin cardboard up and put it around the element, under the cover. This closed the fins on the microphone from the inside to achieve the desired audio without tape on the outside.

You can shape the audio of most microphones that are not simply dead from age easily with capacitors. If you place a capacitor in series with the hot lead, it will cut low out of its response. If a capacitor is placed between the hot lead to ground, it will cut highs off. Varying the amount of capacitance will vary the amount of effect. Start with a .01mfd disc ceramic capacitor and experiment with other values from there. You can also build an active equalizer from an IC that will allow you to boost highs or lows as well as cut them. Plans for IC audio filters are readily available in Radio Shacks Engineers Mini Notebook on Op Amp Circuits, the Heil Ham Radio Handbook, and other ham handbooks over the years.

Compression or audio processing is available on most modern rigs to increase average voice level. The tradeoff on this is some distortion on your audio, depending on the amount of compression you use. Due to this, processing or compression is best used when signals are poor. If you run a lot of compression in a roundtable where everybody is hearing you well, they will find your audio obnoxious. Contestors love compression.

From time to time, you may get a report of "RF in your audio". This is typically characterized by a gurgling sort of distortion in with your audio. This is usually cured by improving your station ground, or by tightening the microphone connector at the radio to better ground the mike cable shield. Occasionally the foil or braid shield on the mike audio lead will break, requiring cable surgery or replacement. Stubborn cases can be cured with ferrite bead chokes where the audio enters the rig.

packet radio for more information. Always include the routing hints with the BBS callsign.

To mail from Packet to Internet:

1. The amateur radio operator must have his callsign registered in the gateway alias list. If you want to mail from packet to a specific amateur on Internet, send mail to 'durham@w2xo.pgh.ps.us' (Internet) or 'W2XO @W2XO.#WPA.PA.USA.NAOM' (Packet BBS mail) with his/her amateur callsign and their Internet address.

2. Once the above is accomplished, packet BBS mail should be sent to 'CALL @ W2XO.#WPA.PA.USA.NAOM'. The mail will automatically be forwarded to the Internet address of the amateur with the 'CALL' callsign. Jim Durham's Internet address is 'durham@w2xo.pgh.ps.us'.

LAN Gateways (Packet wormholes via Internet) Currently a group of amateurs are experimenting with connecting packet LANs together via Internet IP inside IP Encapsulation. Some of the gateways only accept TCP/IP packets, others AX.25 packets. These gateways uses the Internet as a transport medium, thus it is impossible to access the packet radio network from Internet. For more information, join the Gateways mailing list by sending mail to "gateways-request@uhm.ampr.org".

3.0 Networking and special packet protocols
This is a sample of some of the more popular networking schemes available today. By far, there are more customized networking schemes used than listed. Consult your local packet network guru for specific network information.

3.1 Are there any other protocols in use other than AX.25?
AX.25 is considered the defacto standard protocol for amateur radio use and is even recognized by many countries as a legal operation mode. However, there are other standards. TCP/IP is used in some areas for amateur radio. Also, some networking protocols use other packet formats than AX.25. Often, special packet radio protocols are encapsulated within AX.25 packet frames. This is done to insure compliance with regulations requiring packet radio transmissions to be in the form of AX.25. However, details of AX.25 encapsulation rules vary from country to country.

3.2 What is TCP/IP?
TCP/IP stands for Transmission Control Protocol/Internet Protocol. This is commonly used over the Internet wired computer network. The TCP/IP suite contains different transmission facilities such as FTP (File Transfer Protocol), SMTP (Simple Mail Transport Protocol), Telnet (Remote terminal protocol), and NNTP (Net News Transfer Protocol)

The KA9Q NOS program (also called NET) is the most commonly used version of TCP/IP in packet radio. NOS originally was written for the PC compatible. However, NOS has been ported to many different computers such as the Amiga, Macintosh, Unix, and others. Smaller computers like the Commodore 64 and the Timex- Sinclair do not currently have version of NOS available.

3.3 Networking Schemes
What are some of those other networking schemes? During the early days of amateur packet radio, it became apparent that a packet network was needed. To this end, the following packet network schemes where created.

Digipeaters
The first networking scheme with packet radio was Digipeaters. Digipeaters would simply look at a packet, and if it's call was in the digipeater field, it would resend the packet. Digipeaters allow the extension of range of a transmitter by retransmitting any packets addressed to the digipeater. This scheme worked well with only a few people on the radio channel. However, as packet became more popular, digipeaters soon were clogging up the airwaves with traffic being repeated over long distances. Also, if a packet got lost by one of the digipeaters, the originator station would have to retransmit the packet again, forcing every digipeater to transmit again and causing more congestion.

KA-Nodes
Kantronics improved on the digipeater slightly and created KA-Nodes. As with digipeaters, KA-Nodes simply repeat AX.25 frames. However, a KA-Node acknowledges every transmission each link instead of over the entire route. Therefore, instead of an end-to-end acknowledgement, KA-Nodes allow for more reliable connections because acknowledgments only carried on one link. KA-Nodes therefore are more reliable than digipeaters, but are not a true network. It is similar like having to wire your own telephone network to make a phone call.

NET/ROM
NET/ROM was one of the first networking schemes to try to address the problems with digipeaters. A user connects to a NET/ROM as if connecting to any other packet station. From there, he can issue the NET/ROM commands to instruct it to connect to another user locally or connect to another NET/ROM. This connect then connect again means that to a user's TNC, you are connected to a local station only and it's transmissions does not have to be digipeated over the entire network and risk loosing packets. This local connection proved to be more reliable. NET/ROM don't use all of the AX.25 protocol. Instead, they use special AX.25 packet called Unnumbered Information (UI) packets and then put their own special protocol on top of AX.25. This is again used to increase efficiency of it's transmissions. NET/ROM is a commercial firmware (software put on a chip) program that is used as a replacement ROM in TAPR type TNC's. Other programs are available to emulate NET/ROM. Among them are TheNet, G8BPQ node switch, MSYS, and some versions of NET. NET/ROM nodes, at regular intervals, transmit to other nodes their current list of known nodes. This is good because as new nodes come on-line, they are automatically integrated in the network, but if band conditions such as ducting occur, often unreachable nodes are entered into node lists. This causes the NET/ROM routing software to choose routes to distant nodes

that are impossible. This problem requires users to develop a route to a distant node manually defining each hop instead of using the automatic routing feature.

ROSE
Rose is another networking protocol derived from X.25. Rose nodes have a static list of the nodes it can reach. For a user to use a ROSE switch, he issues a connect with the destination station and in the digipeater field places the call of the local rose switch and the distant rose switch the destination station can hear. Other then that, the network is completely transparent to the user. The static routing tables ROSE uses ensures that packet routing does not use unreliable links such as NET/ROM suffers from. However, ROSE suffers from it's inability to change it's routing table as new nodes come on line. The operator must manually change every routing table, thus ROSE networks require greater maintenance times.

3.4 BBS message transfer
Many of the BBS programs used in packet radio allow for mail and bulletins to be transferred over the packet radio network. The BBS's use a special forwarding protocol developed originally by Hank Oredsen, W0RLI. Besides full service BBS's, many TNC makers have developed Personal BBS software to allow full service BBS to forward mail directly to the amateurs TNC. This allows operators to receive packet mail at night and avoid tying up the network during busy hours.

Amateur Packet Radio Frequently Asked Questions-Version 1.5 4 October 1991 This document is for unlimited distribution. Please send corrections and additions to (steve@matt.ksu.ksu.edu). The Packet Radio FAQ's will be posted on a monthly basis to rec.radio.amateur.packet. The current version of this document is available via anonymous FTP at ftp.cs.buffalo.edu.

GARS STARTS VE TEAM

Howie Gould, W4NVF has organized a GARS W5YI-VEC examination session, to be held on the 4th Friday of each month at the St John Neumann Church at 801 Tom Smith Road in Lilburn. Walk-Ins will be allowed, and Howie has even put together a setup where testees can wear headphones for the code element!

To find the church from I-85 take the Indian Trail exit and go east. When Indian Trail crosses US-29, it changes names to Killian Hill Road. continue on Killian hill, and to Five Forks Trickum Rd, turn left, then take the first left on Tom Smith Rd., the Church will be on the left. Turn into the second parking lot, and the testing will be in the Adult Education Building.

Howie has got enough Extra Class operators to sign up so that they will only have to serve 3 or 4 times a year. Volunteer Examiners include W4NVF, AC4UR, WN4S, AD4NQ, AD4S, KD4KCR, AD4OD, KN4N, AC4PD AD4MI K4HRB AD2Q, and KR4IK (A).

Pass the word about this testing session, see it in the list on the next page in bold letters.
GARS...
Putting something back into Amateur Radio.

for most of the packet processing to be handled by the computer. Commonly used with packet TCP/IP software.

modem : Modulator/Demodulator. Converts the analog signals into binary data stream (a series of ones and zeros) for the TNC or a micro-computer . First step in decoding packets.

FCC : Federal Communications Commission. Regulates and issues licenses for amateur radio in the United States.

FM : Frequency Modulation. The radio modulation scheme used for VHF and UHF packet communications.

SSB : Single Side Band Modulation. The radio modulation scheme use for HF packet and satellite packet communications.

AFSK : Audio Frequency Shift Keying. A method of representing digital information by using different audio frequencies modulated on a carrier.

FSK : Frequency Shift Keying. A method of representing digital information by shifting the radio carrier different amounts to represent ones and zeros.

LAN : Local Area Network. A packet network developed for communications throughout a city or region. Often, the LAN uses separate frequencies from inter-city packet links.

1.9 Do's and Don'ts : Rules and Regulations
NOTE: These regulations apply only to amateurs regulated by the FCC (United States), but often are similar to regulations in other countries. [Since I have no experience with amateur radio in other countries, I cannot make any comments. Please bring any notable exceptions to my attention. -Steve]

Although there are no specific rules that apply to amateur packet radio, the general amateur radio rules force some restrictions on packet usage.

Can I set up a TNC at home and one at work so I can check my Electronic mail via packet?

This cannot be done without special restrictions. Amateur radio rules prohibit any business. Since you could have mail from your boss (or maybe even someone selling you something over Internet), that would constitute business activity and is specifically prohibited.

Profanity can also be a complication. Since you have no control over the language used in E-mail, proper filtering is required. Since no filter scheme can catch every offense, it is best to say every message must be hand filtered.

I would like to set up a packet radio gateway between a land line computer network and the packet network. Is this possible?

Yes, and there are several such gateways in use, but they must be managed with caution. Electronic mail may be pass FROM the packet network INTO the land line network without intervention. However, mail passed TO packet radio is considered third party traffic (the sender is not an amateur) and these messages must be hand filtered to assure that rules of message content are followed.

It's my license if I send use packet radio illegally anyway, so what does anyone else care!

Packet radio is one of the few NETWORKED systems in amateur radio. Many people have helped develop the network and there are many amateurs who own parts of the packet radio network. Sending packet BBS mail, digipeating, and sharing the channel involves the licenses of MANY people. Because of FCC rules stating that anything to come out of a transmitter (either in automatic mode or via your direct control) is the licensees responsibility, one illegal message sent over the packet radio network could literally jeopardize the license of thousands of other amateurs. When in doubt, it is best to check with other amateurs about sending the message before it is sent.

I have some ideas on how to use packet radio in a new way, but I don't know if it is legal. Who could tell me if I can do it legally?

The worst thing you can do is talk to the FCC about such an issue. The FCC rules are written to be general enough to encompass but not restrict new radio activities. In the past, any non-thought-out requests sent to the FCC have meant a reduction of privilege for all amateur radio operators. The best source for legal assistance is your national amateur radio association. In the United States, that is the American Radio Relay League (ARRL). Another good place for such conversations is over Usenet/packet mailing lists, or the amateur radio BBS network.

2.0 Computing Network Resources for Amateur Packet radio

This section summarizes the resources available on Internet for amateur packet radio operators.

2.1 What Newsgroups/mailing lists are available?

This is a list of all groups that regularly discuss amateur packet radio. For newsgroups, join the group through use of your news reader. For mailing lists, add a '-request' to the end of the list name to request subscriptions. For listserv groups, send mail to 'listserv' at the node which contains the list. The first line of the mail should be 'SUBSCRIBE groupname yourname'. Send the command 'help' for more information.

rec.radio.amateur.packet (Newsgroup):
General discussions involving Packet Radio.

rec.radio.amateur.misc (Newsgroup):
General amateur radio discussion. Usually does not contain any particular information about Amateur Packet Radio.

rec.radio.amateur.policy (Newsgroup):
Discussion of regulation policies regarding every aspect of amateur radio. Occasionally deals with polices of packet coordination and legal issues of packet radio.

rec.radio.swap (Newsgroup):
General For-Sale for any radio equipment. Occasionally will have packet equipment for sale. Recommended location for any amateur packet radio for-sale items.

info-hams@ucsd.edu (Listserv group):
A digest redistribution of the rec.radio.amateur.misc Usenet discussion.

packet-radio@ucsd.edu (Listserv group):
A digest redistribution of the rec.radio.amateur.packet Usenet discussion.

ham-policy@ucsd.edu (Listserv group):

A digest redistribution of the rec.radio.amateur.policy Usenet discussion

hs-modem@wb3ffv.ampr.org (Mailing list):
Discussion of high speed modems and radios available and future plans. Also includes discussion of networking using high speed modems.

tcp-group@ucsd.edu (Mailing list):
Group discussion technical developments of TCP/IP over packet radio and use of the NOS TCP/IP programs.

gateways@uhm.ampr.org (mailing list):
Discussion of current gateways and future plans for gateways. May deal with sensitive internetworking issues.

For all lists at ucsd.edu, archives may be found via anonymous FTP at ucsd.edu. Some listserv groups also have archives. Send the command 'help' to the group's listserv for more information.

Digest mailings for the ucsd.edu discussions are also available. Send mail to listserv@ucsd.edu with the first line being 'longindex' for more information.

2.2 What anonymous FTP sites are available for getting packet radio information and programs?

This is a sampling of FTP sites that carry amateur packet radio related files. Consult the Archie archive server for info on locating particular files. For more information on using archie, send mail to archie@cs.mcgill.edu with the line 'help'.

ucsd.edu
Primary distribution site of KA9Q's derived TCP/IP packages. Also, general packet radio information.

wsmr-simtel20.army.mil
Very large collection of amateur radio software.

wuarchive.wustl.edu
Mirror site of Simtel20 archives. Unix directory structure - Easier to use then the simtel20 archive.

ftp.cs.buffalo.edu
Supplimental archive site for amateur radio information. Contains current copies of all rec.radio.amateur.* FAQ's.

tomcat.gsfc.nasa.gov
Packet software including Baycomm, Rose, G8BPQ, NOS, etc.

2.3 Are there any gateways for mail or news between Internet and Amateur Packet radio?

Internet / Packet Radio BBS Gateway
Jim Durham, W2XO, maintains a gateway between Internet and the Packet radio BBS system.

To mail from Internet to Packet:
1. Mail to: "bbs@w2xo.pgh.pa.us"
2. Make the first line of the text a Packet BBS "send" command, ie:
   SP TOCALL @ BBSCALL.ROUTING-HINTS < FROMCALL
3. The "subject" line of the Internet mail becomes the "title" line of the Packet BBS mail. NOTE: Because of FCC regulations, Jim must hand filter each message sent FROM Internet TO the Amateur Packet Radio BBS system. Messages should be of minimal length and appropriate content. Read Section 1.9 (Do's and Don'ts: Rules and Regulations) regarding appropriate usage of

Finally, the way you use your microphone makes a difference as well. Most microphones are designed to be close-talked. Have ever heard someone whose audio was so that you could hear his chair squeak, papers rustle on his desk, birds chirping outside his window or an echo from the bare walls of his shack. These are all the badges worn by avid lids. They sound like they are talking down to the "little people" high from atop their soapbox. They achieve this by getting way back, 2 feet or more from their microphone and cranking the mic gain up until the ALC meter pegs to the right side in their rig. If you listen closely you can hear their adenoids rattling. You can't listen to audio like this long without thinking *"What a Jerk"*. Close talk the microphone, but not straight into it. If you talk straight into a microphone close-p a "P" will sound like an explosion, and an "S" will sound like a broken air hose at a gas station. Place the mike at the corner of your mouth, 90 degrees from you face, so you are close to the element, but your breath goes past the element, not into it. Set your alc so that the needle stays within the ALC limit scale and never goes into the red. A good double check for audio level is to say "ahhhhhhhhhhhhh" into the mike at a normal voice level while watching your power output. If you can reduce your mike gain without reducing your power output, your mike gain is too high. Increase your mike gain while saying "ahhhhhhhhh" until your power output level just peaks and you are set. Now take a breath, you're looking kinda blue.

The one exception I have seen to the rule of close-talking microphones is the little goose necked desk mike that is available from Icom for their radios. No matter how you set the mike gain, if you close talk this mike it will sound muffled and distorted, and if you get back 8-10 inches it sounds great! No room resonance at all and clear as a bell.

All of this makes you wonder, why don't the manufacturers make better sounding mikes to start with. Well, we can only guess, but when companies like Heil start selling more microphones than the manufacturers they start to sit up and take notice. One problem is everybody doesn't share the same conception of what good SSB audio sounds like. What I hope you gain from this, is the awareness to check your own audio, and make a conscious effort to make it sound the way you want it to sound for each application of ham radio you enjoy. Have fun.

MOBILE RADIO INSTALLATION HINTS

Several articles have appeared recently in the various amateur publications detailing the problems that some hams have had with the installation of mobile radio equipment in their cars or trucks. Some of these articles have mentioned failures of the electronic control units (ECU's) that the dealer attributed to the radio equipment.

Since this is important to all of us I thought it might be a good idea to contact several of the automobile manufacturers directly to see what their opinion was. I have spoken to representatives of Ford Motor Company and General Motors Company for their recommendations on how to install two-way equipment in their products. Here is a brief run down on their recommendations.

Ford Motor Company and General Motors both recommend that your transceiver be installed with direction connection to the battery and no grounding in the passenger compartment. Entrance of the power cable from the engine compartment should be through a left side grommet that is provided for that purposes and through which no other wires pass. Both the positive and negative leads of the power cable should be fused.

Both companies stated that there should be no problems with installing HF, VHF, or UHF equipment in their products. They did caution that you should keep your transceiver as far away from the ECU ("Brain") as possible, and that power limits of 100 watts should not cause any problems. If you are unsure where the vehicle's "brain" is you should contact your authorized dealer.

Plastic bodied car owners should install the antenna near a metal frame section and use a short length of wire to bond the antenna base to the chassis of the vehicle.. (*I wonder if that is plastic bodied cars or plastic bodied owners..? ed*)

Many modern vehicles now come equipped with glass that has a think metallic coating for defrosting or to control solar glare. You cannot use thru-the-glass antennas on these vehicles! You should contact your dealer to find our if your vehicle has this type of glass.

Both of the manufacturers mentioned in this article have special divisions to assist you in the installation of two-way equipment. I have listed their telephone numbers for your reference at the end of the article.

Mr. Don Hibbard Jr. of General Motors and Mr. Pat Quinn of Ford provided much of the information for this month's column, and we appreciated their assistance. Both are active hams so if you should have a question you will be speaking to someone who understands your concerns.

Ford Motor Company, (313) 323-2014. General Motors Company (313) 685-6150.
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Some Kenwood information that may be of interest: Kenwood U.S.A. Corporation, Amateur Radio Customer Service, P.O. Box 22745, Long Beach, CA 90801-5745.
(Free) Bulletin Board: (310) 761-8284, On line 24 hours a day, 7 days a week.
Customer Relations: (310) 639-7140, 8:30 AM-5:00 PM Pacific time Mon.-Fri.
Parts: East Coast (800) 637-0388, 9:00 AM-6:30 PM Eastern time Mon.-Fri.
West Coast (800) 262-1312, 8:30 AM-4:30 PM Western time Mon.-Fri.
Sales Department: (310) 639-4200, 8:30 AM-5:00 PM Pacific time Mon.-Fri.
FAX: (310) 604-4487, ATTN: Amateur Radio Customer Relations

Frequently Asked Questions for Amateur Packet Radio
by Steve Schallehn

INDEX
1.0 Basic Packet Radio Information
1.1 What is packet radio?
1.2 What is amateur radio?
1.3 What can I do on packet radio?
1.4 Why packet over other digital modes?
1.5 What elements make up a packet station?
   TNC (Terminal Node Controller)
   Computer or Terminal
   A radio
1.6 What do you mean we can all use the same channel?
1.7 What is AX.25 ?
1.8 Definitions: Commonly used terms in Amateur Packet Radio
1.9 Do's and Don'ts : Rules and Regulations
2.0 Computing Network Resources for Amateur Packet radio
2.1 What Newsgroups/mailing lists are available?
2.2 What anonymous FTP sites are available
2.3 Are there any gateways for mail or news Internet / Packet Radio BBS Gateway LAN Gateways (Packet wormholes via Internet)
3.0 Networking and special packet protocols
3.1 Are there any other protocols in use other than AX.25?
3.2 What is TCP/IP?
3.3 Networking Schemes
What are some of those other networking schemes?
   Digipeaters
   KA-Nodes
   NET/ROM
   ROSE
3.4 BBS message transfer

TEXT
1.0 Basic Packet Radio Information
1.1 What is packet radio?
Packet radio is digital communications via amateur radio. Packet radio takes any digital data stream and sends that via radio to another amateur radio station. Packet radio is so named because it sends the data in small burst, or packets.
1.2 What is amateur radio?
Amateur Radio (sometimes called Ham Radio) is individuals using specified radio frequencies for personal enjoyment, experimentation, and the continuation of the radio art. Amateur radio operators must be licensed by their government. In the United States, the Federal Communications Commission issues amateur radio licenses. Normally, a test on operating practices, radio theory, and in some cases morse code proficiency test is administered. Amateur radio is not to be used for commercial purposes. Also, amateur radio operators are restricted from using profanity and using amateur radio for illegal purposes.
For more information on Amateur Radio in general, see the monthly frequently asked questions posting in rec.radio.amateur.misc.
1.3 What can I do on packet radio?
Keyboard-to-Keyboard contacts:
Like other digital communications modes

packet radio can be used to talk to other amateurs. For those who cannot use HF frequencies, 2 amateurs can talk to each other from long distances using the packet radio network.

Packet BBS operations:

Many cities have a packet Bulletin Board System (BBS) attached to their local packet network. Amateurs can check into the BBS's and read messages from other packet users on almost any topic. BBS's are networked together over the packet network to allow messages to reach a broader audience than your local BBS users. Private messages may also be sent to other packet operators, either locally or who use other BBSs. BBS's have the latest ARRL, AMSAT, and propagation bulletins. Many BBS's have a file section containing various text files full of information on amateur radio in general.

DX Packet Cluster:

A recent development is use of packet radio for DX spotting. HF operators connect to the local DX Packet Cluster for the latest reports on DX. Often a user will 'spot' some hot DX and distribute the DX report real time.

File Transfer:

With special software, amateurs can pass any binary files to other amateurs. Currently, this is done with TCP/IP communications, YAPP, and other specialized protocols.

Satellite Communications:

Many of the amateur radio satellites contain microcomputer systems that can provide special information to amateurs. Some satellites contain CCD cameras on board and you can download images of the earth and the stars. Others provide store and forward packet mailboxes to allow rapid message transfers over long distances. Some satellites use AX.25, some use special packet protocols developed for satellite communications. A few transmit AX.25 packets over FM transmitters, but most use SSB transmissions.

1.4 Why packet over other digital modes?

Packet has three great advantages over other digital modes: transparency, error correction, and automatic control.

The operation of a packet station is transparent to the end user; connect to the other station, type in your message, and it is sent automatically. The Terminal Node Controller (TNC) automatically divides the message into packets, keys the transmitter and sends the packets.

While receiving packets, the TNC automatically decodes, checks for errors, and displays the received messages. In addition, any packet TNC can be used a packet relay station, sometimes called a digipeater. This allows for greater range by stringing several packet stations together. Packet radio provides error free communications because of built in error detection schemes. If a packet is received, it is checked for errors and will be displayed only if it is correct.

With VHF/UHF packet, many countries allow packet operators to operate in automatic control mode. This means that you can leave your packet station on constantly. Other users can connect to you at any time they wish to see if you are home. Some TNC's

even have Personal BBS's (sometimes called mailboxes) so other amateurs can leave you messages if you are not at home.

Another advantage of packet over other modes is the ability for many users to be able to simultaneously use the same frequency channel simultaneously.

1.5 What elements make up a packet station?

TNC (Terminal Node Controller)

A TNC contains a modem to decode the audio signals into digital signals. It also contains a modem and a micro-computer to convert the digital signals into text that can be sent over a RS-232 port to the computer. The CPU also handles the protocol overhead of the packet station. When you send data, it takes the text, puts error checking on it (CRC) and also puts it in an envelope for sending. When receiving a signal, it takes it out of the envelope, and sends the message to the computer. Most TNC's use 1200 baud for local UHF/VHF packet and 300 baud for long distance HF packet communications. For VHF/UHF packet, higher speeds modems are available, but often are harder to interface.

Computer or Terminal

This is the user interface. A computer running a terminal program or just a dumb terminal can be used. For computers, any phone modem communications program can be adapted for packet use or customized packet radio programs are available.

A radio

For 1200 baud UHF/VHF packet, commonly available narrow band FM voice radios are used. For HF packet, 300 baud data is used over single side band modulation. For high speed packet (anything greater than 1200 baud), special radios or modified FM radios must be used.

1.6 What do you mean we can all use the same channel?

Packet radio uses a protocol called AX.25. AX.25 specifies channel access (ability to transmit on the channel) to be handled by CSMA (Carrier Sense Multiple Access) If you need to transmit, your TNC monitors the channel to see if someone else is transmitting. If no one else is transmitting, then the radio keys up and the TNC sends it's packet. All the other stations hear the packet and do not transmit until you are done. Unfortunately, 2 stations could accidentally transmit at the same time. This is called a collision. If a collision occurs, neither TNC will receive a reply back from the last packet it sent. Each TNC will wait a random amount of time and then retransmit the packet. In actuality, a more complex scheme is used to determine when the TNC transmits. See the "AX.25 Protocol Specification" for more information.

1.7 What is AX.25 ?

AX.25 (Amateur X.25) is the communications protocol used for packet radio. A protocol is a standard for how two computer systems are to communicate with each other, somewhat analogous to using business format when writing a business letter. AX.25 was developed in the 1970's and based of the wired network protocol X.25. Because of the

difference in the transport medium (radios vs wires) and because of different addressing schemes, X.25 was modified to suit amateur radio's needs. AX.25 includes a digipeater field to allow other stations to automatically repeat packets to extend the range of transmitters. One advantage of AX.25 is that every packet sent contains the senders and recipients amateur radio callsign, thus providing station identification with every transmission.

1.8 Definitions: Commonly used terms in Amateur Packet Radio

HDLC: (High-Level Data Link Control Procedures) A standard for high level link control. (ISO 3309)

AX.25 : Amateur X.25 protocol. The basis of most packet systems. See section 1.7.

TAPR : Tucson Amateur packet Radio. Was the first group to create a packet radio TNC using AX.25. Soon a TAPR TNC became cloned by many others. TAPR continues development of packet radio equipment.

digipeater : A packet radio station used for repeating packets. See section 3.3.1 for more information.

digi : Short name for a digipeater

NET/ROM : A scheme for packet radio networking. See section 3.3.3 for more information.

TCP/IP : Transmission Control Protocol/Internet Protocol. A set of utility programs used over AX.25. See sections 3.2 for more information.

KA9Q NOS : (KA9Q Network Operating System) A TCP/IP program originally developed by Phil Karn, KA9Q. Currently there are many different versions available. See section 3.2 for more information.

NODE : A network node. Often a network node running NET/ROM.

KA-Node : A simple networking scheme developed by TNC maker Kantronics. See section 3.3.2 for more info.

CSMA : Carrier Sense Multiple Access. A system allowing many stations to use the same radio frequency simultaneously for packet communications.

TNC : Terminal Node Controller. See section 1.5 for more information.

AMPR : Amateur Packet Radio.

44 net : The class A network designator for TCP/IP amateur packet radio. All numerical TCP/IP addresses are in the format of 44.xxx.xxx.xxx .

ampr.org : The high level domain recognized on Internet for amateur packet radio TCP/IP.

RS-232 : (RS-323C) A standard for interconnection of serial peripherals to small computer systems. In packet radio, RS-232 is the most common interface between TNC's and the Computer/Terminal.

protocol : A standard used for intercommunications between different computer systems.

CRC : Cyclical Redundancy Code. The error detection scheme included in each packet. Verify that the packet was received error free.

KISS : Keep It Simple Stupid. A simple interface developed for communications between TNCs and computers. This allows

WISDOM OF THE AGES
Applied to Amateur Radio

Happy the man who has been able to learn the causes of things.
Vergil (B.C. 70-19)

Science is facts; just as houses are made of stones, so is science made of facts; but a pile of stones is not a house and a collection of facts is not necessarily science.
Henri Poincare (1854-1912)

Logical consequences are the scarecrows of fools and the beacons of wise men.
Thomas Huxley (1825-1895)

All things are hidden, obscure and debatable if the cause of the phenomena be unknown, but everything is clear if this cause be known.
Louis Pasteur (1822-1895)

All exact science is dominated by the idea of approximation.
Bertrand Russell (1872-1970)

Every science begins as philosophy and ends as art.
Will Durant (1885-1981)

Observation, not old age, brings wisdom.
Publilius Syrus (B.C. 42)

Science cannot solve the ultimate mystery of nature. And that is because, in the last analysis, we ourselves are part of nature and therefore part of the mystery that we are trying to solve.
Max Planck (1858-1947)

10-METER REPEATERS
by Dean Matthews, AD4OD

"Serious" contesters, DX-ers, county hunters, state collectors and other persons interested in amateur radio solely for the purpose of award seeking or technical gratification might want to skip this article and skip on to the next. What we are delving into here is pure fun. Most "Paper Chasing" disallows the use of repeaters for a contact, but in reading through Part 97, we can find no restrictions whatsoever to having fun on ham radio. For those who don't mind fun, read on.

In a roundtable on 40-meters one night, W8SWC, a participant in Detroit wanted to discuss an antenna subject at length, but we had no path between us. Through a relay station, he asked if I had 10-Meter FM capability, which I did, but my antenna was cut for the CW portion of the band. He had me listen for him on 29.66 MHz FM and try to load up on 29.56 with my tuner, to work a split. I could hear him perfectly, nearly full quieting! Unable to achieve better than a 2.5 to 1 match with my tuner, my radio reduced power to about 40 watts, and my antenna was not efficient, but he could hear me fine. We were working through a 10-Meter repeater in the Virgin Islands!

A few weeks later on a driving trip to Savannah the HF bands were dead. I decided to see if I could hit that repeater again, while mobile. I screwed in my trusty Hustler 10-Meter resonator, set up the split and lo-and-behold there was the repeater, with a S9+10db signal. I ragchewed a little with a guy, and then we started being interrupted by another QSO, and they by us.

I started to get my dander up, prepared to spout all the "we were here first", "why don't you listen before you transmit" and "nobody

owns a frequency"-isms that we use on 40 meters at night when we are defending our little cubbyhole on the band, when the band changed and I lost the first guy completely. When the repeater I.D.'ed, I discovered I was on a different repeater. I looked it up in the ARRL Repeater Directory and learned the first one I was on was in Dallas, Tx... and the second one was in the Virgin Islands. Confused, but undaunted I read on.

Seems there are only four co-ordinated repeater pairs on 10-meters, but there are 5-½ pages of repeaters listed in the directory! Apparently the thinking is that for long haul contacts, the band won't be open to two repeaters at the same time from one location very often. These repeaters are used locally for ground wave propagation, and the users seem to enjoy polite interlopers.

When I lost contact with any repeaters on 29.66 MHz, I set up 4 memory locations in my Yaesu 757GXII to scan the outputs of all the repeaters for activity. My trip to Savannah ended all to soon, and a couple days later I did it again all the way back home. This really makes a long, tedious driving trip go fast.

Many repeaters link over to other bands including the 144, 220, 440 and even the 1240 MHz band, giving codeless technicians access to these frequencies from the other end. The actual 10-Meter input and output frequencies are in the general class portion of 10-Meters.

The standard frequency pairs are (output/input) 29.62/29.52 29.64/29.54 29.66/29.56 29.68/29.58 MHz. Consult the ARRL Repeater directory for other odd pairs and links. In Georgia, three clubs are listed as having 10-Meter cross-linked repeaters including the Big Shanty Repeater Group locally. Check with these clubs about using their VHF link frequencies and procedures.

Try something new with 10-Meter repeaters, but be advised...you might have fun.

Detach and Mail

GARS MEMBERSHIP APPLICATION (SHORT FORM)

Amateur Callsign:_____ Class: _____ Expires:___/___/___ Date Of Birth:___/___/___
Name:_____
Address:_____
City/State/Zip:_____
Home Phone:_____-_____ Work Phone:_____-_____ Fax-Phone:_____-_____
Occupation:_____
Type of Membership (□-Individual □-Family) ARRL Member? (Y/N):____ Life Member? (Y/N):____ Additional Members for Family Memberships:

Name:	Call:	Class:	Birthday	ARRL (Y/N)	Life (Y/N)
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

Check Interests:
□-Novice Class Instruction □-Field Day Operation □-Repeater Maintenance □-Gars Club Booth Staffing □-Community Events
□-Emergency □-Administrative □-Fund Raisers □-Other_____

Dues: $25.00 for Individual, $35.00 for family from April 1 to Sept 30; $12.50 Individual or $17.50 Family from October 1 to March 31
Mail your completed application with check made out to GARS to:
Gwinnett Amateur Radio Society
P.O. Box 88
Lilburn, GA 30226

Atlanta Metro Area VE/VEC Examination Schedules From SERA Repeater Journal and other sources. Published as a service to its members, *GARS* assumes no responsibility for errors or schedule changes. Call and confirm schedules before going.

1st Saturday Peachtree City CA–VEC 9:00AM
Ptree City Hall Exit 12 off I–85
Mike Murphy, KB4KZY – 487-7494   Walk-In Exams

1st Sunday – Lawrenceville W5YI–VEC – Jackson EMC 2:00PM
461 Swanson Rd – L'ville – Walk-In Exams
Duane Reynolds, WB2YAD – 962-9582

1st Monday – Roswell CA–VEC 7:00PM
St Ann Catholic Ch. 4905 Roswell Rd – Marietta
Delaine McCarthy, KM4FV – 993-9758

2nd Tuesday – Walton EMC 7:00PM
3645 – Lenora Church Rd, Snellville   Walk-In Exams

2nd Saturday – Stn Mtn CA–VEC 8:30AM
Stone Mountain–Methodist Church
Hal Martin, KI4RD – 439-6430   Walk-In Exams

4th Friday GARS W5YI–VEC – 7:00PM – St John Neumann Church,
801 Tom Smith Rd, off Five Forks Trickum Rd, Lilburn
Howie Gould, W4NVF 921-8362 Walk-In Exams – Headphones!

4th Sunday N Atlanta ARRL–VEC – Church of the Atonement
2:30PM   Highpoint Rd – Neil Foster, KC4MJ   449-3340

Even Months – Dalton WCARS–VEC
Unity Bapt Church – Dalton Bert Coker, N4BZJ   706/259-5625
or Harold Jones, N4OTC 706/673-2291

HAMFEST CALENDAR

January	15 ..	Hamfest – Greenwood, S.C. TI–147.165+
January	22 ..	Citrus Co Hamfest – Crystal River, FL TI–146.355+
January	22 ..	TVARN Hamfest – Gallatin, TN TI–147.9–
January	23 ..	Hamfest – Pinellas Park, FL
January	29? .	Hamfest – Sarasota, FL TI–146.31+
January	29 ..	Hamfest – Greenville, AL
February	5 ...	Hamfest – Charleston, SC TI–146.19+
February	5–6 .	Kerbella Hamfest – Knoxville, TN
February	5–6 .	JARC Hamfest – Jacksson, MS
February	12? .	Owensboro ARC Hfst – Owensboro, KY TI–147.81–
February	18–20	SE Div ARRL Conv & Hamcation –Orlando Fl
February	20 ..	Hamfest – Elkin, NC TI–144.77+
February	26 ..	Hamfest – Pensacola, FL
February	26 ..	Hernando ARAs Hamfest – Brooksville, FL
February	26 ..	Hamfest – Dalton, GA TI–144.63+

?=Date not confirmed. Several entries taken from SERA Journal.
Georgia locations are bold. <u>Atlanta locations are bold and underlined</u>

NOMINATING COMMITTEE REPORT

The Nominating Committee has recommended the following GARS members for club officers in 1994, with their consent:

W4NVF	Howard Gould	President
KD4QFD	Larry Osborne	Vice Pres.
KC4GYM	Ike Chapman	Secretary
KA4KKF	David Adcock	Activities Mgr.
AD4OD	Dean Matthews	Editor

As of this writing, Treasurer and License Trustee were not committed. Call W4WKP

Gwinnett Amateur Radio Society
P.O. Box 88
Lilburn Ga, 30226

P=*427 (+) Number   SD=*22 (+) 82   Next Dues:04/01/94